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THE TAXONOMIC ASPECT OF THE SPECIES QUESTION

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As long as species were supposed to be actual things, "created as separate kinds at the beginning," that botanists "discovered," as explorers discover islands in the ocean, there was no serious "species question." A botanist might make a mistake, and announce the discovery of a new species, when he had merely found a variety of an old species; as an explorer might mistakenly announce the discovery of a new island, when as a matter of fact he had only seen an unfamiliar coast of a long-known island.

Nature produces individuals, and nothing more. She produces them in such countless numbers that we are compelled to sort them into kinds in order that we may be able to carry them in our minds. This sorting is classification—taxonomy. But right here we are in danger of misunderstanding the matter. We do not actually sort out our individuals. We imagine them sorted out. It is only to a very slight extent that the systematic botanist ever actually sorts out individuals. When he has a considerable number of individual dried plants in his herbarium, he may sort them out, but these are but an infinitesimal portion of all the individuals in the world that we imagine to be sorted, but that are actually unsorted.

So species have no actual existence in nature. They are mental concepts, and nothing more. They are conceived in order to save ourselves the labor of thinking in terms of individuals, and they must be so framed that they do save us labor. If they do not, they fail of their purpose. Here we perceive one of the principles which must control in the limitation of species. If we multiply our species unduly we approach too near to the individuals, and we are as much burdened as though we had not invented species. On the other hand, if we make too few species those we do make include so many variations from the type that confusion results again. We must steer a course between these two extremes.

I am well aware that every man who has split up species upon any pretext will at once lay his hand upon his heart and assure himself that he has done this very thing of avoiding these extremes. I have yet to find a man who has not felt that all of his species were conservatively made, and that had he been radically inclined he could have made many more. And yet the fact remains that much of the species-making of recent years has rendered it vastly more difficult than formerly for us to obtain a grasp of the flora of a region. Instead of helping us, this perverted notion of the purpose and the proper limitation of species has actually proved to be a hindrance. How much, for example, does the average botanist know nowadays about the species of Cratægus? It will not avail to say that "he knows as much as he ever did," for once he did study them somewhat, but now he is compelled to pass them by as quite too difficult for him to undertake to distinguish with the time he has at his command. The inordinate multiplication of species has hindered instead of advanced our knowledge, and this fact is sufficient to condemn it utterly.

We are in danger of destroying the usefulness of taxonomy in our zeal for describing every differing form as a separate species. We have lost sight of the primitive reason for the formation of species, namely, that we should have fewer things to hold in mind. Primitively the aim was to have as few species as possible. Now too often we look upon the addition of new species as a contribution to knowledge, when, on the contrary, it may be a hindrance.

The Linnean conception of species may have been too broad, but it had the merit of being understood. It has yet to be shown that that conception of species has been outgrown. The human mind is pretty nearly the same to-day that it was a century and a half ago. The botanists of to-day may be able to recognize species where Linné, and DeCandolle, and Gray could not, but the difference is by no means great enough to warrant such great changes as have taken place in the conception of species by some recent systematists. The human mouth is probably a little smaller than it was thousands of years ago, and probably the tendency is to a reduction of its dimensions, but it certainly has not changed so much as to warrant a marked reduction in the size of tablespoons; much less does it give sanction to any proposal to reduce them to the size of miniature saltspoons! The old spoons that still fit the average human mouth very well are not likely to be displaced for much smaller ones. I think it is highly probable that in like manner we shall insist upon the old measure of species, for the good reason that it is still well fitted to our mental needs and mental capacity. The experience of botanists as a body sanctions the general idea and limitations of species as understood by Linné, by DeCandolle, by Gray, rather than that of the species-makers of recent years. This sanction is not in deference to authority, but for the reason that their species commend themselves to us. We prefer the Linnean idea of species not because it is Linnean, but because it is more useful than those proposed more recently. Probably one reason for the vogue of the Linnean conception of species for the past century and a half is that it is so well adapted to the mental requirements of botanists the world over. Linné was fortunate in adopting a measure of species which was neither so small as to be difficult to apprehend, nor so large as to be cumbersome. It may have been by happy chance that he hit upon this acceptable measure of species; it is much more likely that it was but another example of that genius which gave him such great pre-eminence among the botanists of his day, and enabled him to make so lasting an impression upon systematic botany.

We have given a good deal of attention to the laws of botanical nomenclature, a matter of considerable, but by no means paramount, importance, while we have pretty largely neglected the far more important laws of botanical taxonomy. We have legislated at length in regard to names of species, genera, families, orders, and so on to the end of the list, while we have scarcely touched upon the far more important question of what these groups should be. We have been more concerned with the chaff than with the wheat itself.

We are forced to the conclusion that we have rather foolishly spent our time in discussing the less important matters of nomenclature, while we have permitted anarchy to thrive in the far more important work of the making of species. We have had botanical congresses which formulated laws in regard to the *naming* of species, but as to the *making* of species each botanist is allowed to follow his own notions without any guide whatever, and what is worse still, without any restrictions. The result is what we should expect. It is confusion; it is scientific anarchy. If an indefinite number of men were to contribute stones for a building, there being no agreement among them as to shape or dimensions, what would be the result? No worse, I am sure, than what has occurred in the erection of that portion of the edifice of science with which we are concerned to-day. It is almost incredible that we should have permitted the present condition of taxonomy to continue. Why mere tyros, wholly untrained in the underlying principles of the science of classification, should be allowed to contribute to the confusion of taxonomy is a matter which may well make us marvel. But there have been words of admonition. Nearly thirty years ago Dr. Gray in his "Botanical Text-book" spoke of the necessity of experience and "the critical study of the classical botanical works," and then said "No one is competent to describe new plants without such study." Wiser words in regard to the question before us were never written, and had they been heeded during the past quarter of a century we should not have had the present condition of confusion in systematic botany. Certainly our practise of allowing everybody, whether trained for the work or not, to determine the limits of species is taxonomic anarchy.

It is increasingly evident that botanists must insist upon an adequate training by those who are proposing to make and describe new species. Every teacher of botany should impress his pupils with the seriousness of the work of making new species, and should train them to feel that such work should be left to the few who are masters in the subject. The rule which goes into effect to-day, requiring diagnoses of new species to be in Latin, will prove a deterrent to the tyros who would rush into print with their diffuse English descriptions. In this matter, at least, we should all uphold the Vienna code, and rigidly exclude as invalid all publication of species not conforming to it. A more effective deterrent could be provided by an agreement of botanists to restrict publication to certain botanical journals, whose editors should then exercise a revisionary control over all publication of new species. I am well aware of the objection that will be made to such a taxonomic censorship, but we have gone so far in the direction of individual liberty that it has degenerated into license, and some such drastic measure is loudly called for. When we had masters in botany, who were kings to whose authority all must bow, we complained bitterly. Now that the kings are dead the democracy of botany is suffering from the misrule of anarchy. If democracy will not control its subjects we shall have to return to a botanical oligarchy, or even to a dictatorship, for anarchy can not be endured.

Has not the time come for botanists to establish rules governing and restricting the making of species? I am convinced that the next step forward in systematic botany must be the placing of limitations upon the men who are setting up new species, compelling them to conform their species to the conditions which make species necessary.

Of course this is not the time, nor is it the place, for final action in regard to this matter, and, moreover, I am certainly not the one to formulate rules for species-making, yet I may be allowed to suggest some botanical dicta or aphorisms as a short prodrome of a taxonomic code.

1. Taxonomy is a means, not an end; it does not exist for the taxonomists alone, but for the whole body of botanists.

2. The first purpose of classification is to include all individual plants in as small a number of species as possible.

3. That classification of the plants of the world most fully accomplishes its purpose which gives an adequate picture of the whole in the simplest form.

4. Species have been invented in order that we may refer to great numbers of individuals collectively, instead of singly; therefore the number of species must be far less than the number of individuals.

5. Since we make use of species for the purpose of saving labor in making the acquaintance of plants, it follows that those species whose limitations are so faint or vague that we apprehend them with difficulty have no reason for existence.

6. Scientific classification does not require that every difference in structure and habit be made the basis of a separate species. There must be room left for individual variation, otherwise we should have as many species as there are individual variations.

7. The taxonomist should look for resemblances rather than for differences, so that he may make fewer rather than more species.

8. Species must be so made as to be understood and appreciated by the botanists for whom they are described. A species has no legitimate reason for existence whose limits are perceptible only to its maker.

9. Experience must tell us what limitations of species are most convenient.

10. In making a species the guiding principle must be that it shall be recognizable from its diagnosis. A species that is not distinguishable by its diagnosis has no right to existence.

11. A diagnosis should be brief enough to be remembered readily, for this reason Linné's twelve-word diagnoses are worthy of imitation.

12. Long and complex descriptions should never be used for the limitation of species, and when such long and complex descriptions are found to be necessary this is a sufficient indication that the species should not be made.

These aphorisms are merely illustrative, and by no means cover the whole ground. Others will suggest themselves, especially to those of you who have been engaged in taxonomic work. It seems to me so desirable that a reform in taxonomy should be instituted that I venture to suggest that this society appoint a committee to report upon the feasibility of restoring species to their original importance and dimensions, the possibility of restricting species-making to those who are competent, and also of restricting publication to selected journals, thus involving some kind of taxonomic censorship.